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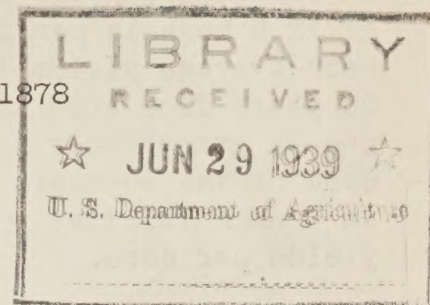
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Bureau of Entomology and Plant Quarantine

STEM RUST DESTRUCTIVE TO SPRING WHEAT IN 1878

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Although pioneer farmers of the Middle West knew that the presence of stem rust on their grain meant reduction in yield, accurate rust observations were not made until comparatively recently. There were severe epidemics in 1916 2/ and in 1904, 3/ but previous to this reports of rust are scattered and little is known regarding epidemics. The present report represents an attempt to summarize material regarding 1878, one of the early rust years. Because of nonavailability of material, it has been necessary to restrict discussion largely to Minnesota.

The wheat crop of 1878 was generally reported as a failure in southern Minnesota, northern Iowa, and Wisconsin--the most important spring wheat States at that time. Yields for the three States are shown below, together with price and value. 4/

	1878				10-yr. av. 1876-1885		
	Acreage	Yield (bu.)	Price per bu.	Value per acre	Yield (bu.)	Price per bu.	Value per acre
Minnesota	2,365,775	12.0	\$0.51	\$6.12	12.8	\$0.79	\$10.10
Wisconsin	1,706,000	12.4	.67	8.31	12.2	.89	10.72
Iowa	3,250,000	9.4	.50	4.70	10.2	.77	7.74

In Minnesota and Iowa the yields were below average, while in Wisconsin the yield was slightly above average. The principal wheat-growing area in Minnesota at that time comprised the southeastern section, with the

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1/ This study was made at the suggestion of E. C. Stakman, to whom the writer expresses appreciation for suggestions and assistance.

2/ Humphrey, Harry B. Cereal diseases and the national food supply. U. S. Dept. Agr. Yearbook 1917: 481.

3/ Carleton, Mark Alfred. Lessons from the grain-rust epidemic of 1904. U. S. Dept. Agr. Farmers' Bull. No. 219. 1905.

4/ Wheat, yields per acre and prices, by States, 50 years 1866-1915. U. S. Dept. Agr. Bull. 514. 1917.



amount grown decreasing toward the west and northwest. In 1878, 2,365,775 acres were sown to wheat, or nearly 69 percent of the total cultivated area of the State,<sup>5/</sup> but only 29,484,503 bushels were produced, an average yield of 12.5 bushels per acre. In the years preceding 1878 there frequently had been average yields in the State of from 15 to 17 bushels. In four of the 20 years from 1866 to 1885 the yield was as low or lower, although in only one--a grasshopper year<sup>6/</sup>--was the average as low as the yields in 1878 in some of the southern counties. The names of these counties are shown below in their relative geographic positions in the State, together with the yields per acre.

Stevens								
11.1								
Lac Qui								
Parle								
11								
	Renville							
	12.1							
		Dakota						
		12.3						
	Redwood	Brown	Nicollet					
	10.9	9.5	9.5					
				Rice				
				11.8				
Murray	Cotton-	Watson-	Blue	Waseca	Steele	Dodge	Olmsted	Winona
8.8	wood	wan	Earth	11.6	11.4	8.4	11.2	12.2
	9.4	9.8	12.7					
Rock	Nobles	Jackson	Martin	Fari-	Freeborn	Mower	Fillmore	Houston
9.4	8.3	8.3	9.4	bault	9.5	6.7	8.8	9.9
				9.8				

As in recent rust disasters, however, yields have not told the whole story. The quality of the crop, reflected by price and value, is indicated by the figures given above. In two other years in each of these States during the 1866-1885 period the price was as low as, or lower than, it was in 1878, but the value index represents an absolute low for Minnesota and Iowa and very nearly a low for Wisconsin. In 1878 much of the wheat was not cut, and most of that which was harvested proved disappointing as to quality, grading from No. 2 <sup>7/</sup> to rejected. In addition, considerable wheat was fed to chickens. As one farmer humorously put it, "If threshers are going to make any money this fall, they will have to charge for the amount of straw run through, and not grain."<sup>8/</sup> Almost all No. 1 wheat harvested in Minnesota

<sup>5/</sup> Robinson, Edward Van Dyke. Early economic conditions and the development of agriculture in Minnesota. 306 pp. Minn. Univ. Studies in Soc. Sci. No. 3. 1915. p. 79.

<sup>6/</sup> This was 1876, the worst grasshopper year in the 1872-77 period. Robinson, *op. cit.*, p. 76.

<sup>7/</sup> No. 2 wheat had to weigh 56 lbs.; No. 3, not less than 54. *St. Paul Pioneer Press*, Aug. 2, 1878.

<sup>8/</sup> *Preston Republican*, Aug. 15, 1878.



came from the western and northwestern parts of the State. Notes regarding quality follow:

Rochester Post, Aug. 2. Quite a number of farmers in the county have abandoned fields for burning. Aug. 9. New wheat taken to mill, 52 lbs. to bushel. Put through fanning mill, one-third went through screen.

Drew, Edward B. Papers, 1848-1893 (Rollingstone, Winona County). Minn. Hist. Soc., St. Paul. Aug. 17. "I cut a piece of wheat next to the woods that I had concluded not to cut. Burned it up after supper." Aug. 26. "Have about 20 good-sized loads of the stuff piled up. It will only make feed for the sheep."

Rochester Record, Aug. 26. Report from 139-acre farm at Cascade: 12 bu. A. of 50-52 lbs. per bu., rejected.

Blue Earth City Post, Aug. 10. "All farmers who come to this office report their crops badly damaged, and hardly worth cutting. The yield will not exceed 10 bu. per A."

St. James Journal (Watonwan Co.), Sept. 6. First carload of 1878 crop shipped from Luverne graded No. 3 and paid about 50 cents a bushel.

Glenwood Eagle, Aug. 17. Light wheat coming in to Morris, Stevens County, of 55½ lbs. per bu. (Yield in this county 11.1 bu. average, although north of the most seriously affected area.)

LaCrosse Chronicle, reprinted in Preston Republican, Aug. 15. Bad wheat along line of Southern Minnesota Railway. Will grade in most instances below No. 3. Out of 22 stations only Wells and Good Thunder report a grade up to No. 2. No. 3 to condemned at following stations: Wykoff, Fountain, Lanesboro, Peterson, Rushford, Hokah, Albert Lea, Hayward, Oakland, Ramsey, Brownsdale, Dexter, Great Meadow, Spring Valley, Mapleton, Easton, Alden, and Armstrong.

Howard County Times, Cresco, Ia., July 25. Recommends saving wheat for emergency feed for stock. "Unthreshed wheat straw with from 3 to 5 bu. of grain per acre in it would make good fodder..."

Preston Republican, Aug. 15; reprinted from Decorah Republican (Iowa) of Aug. 9. "We do not now believe that there will be an average of 3 bushels of wheat per acre in Winneshiek County. Very few farmers have reaped on all the land sown; and where they have done so, a part of it is designed for feed and will not be threshed."

The low yields and poor-quality grain came as an unexpected blow in view of the alluring prospects early in the season for an abundant harvest.<sup>9/</sup> On June 1 the U. S. Department of Agriculture reported the condition of spring wheat as 106 percent for Minnesota, 110 for Wisconsin, and 110 for Iowa,<sup>10/</sup> and the largest crop on record was anticipated. There was promise

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<sup>9/</sup> "Fields...are now covered with the most luxuriant crop which this country or any other country ever saw." New Ulm Herald, June 16. According to the St. Paul Pioneer Press, June 12, prospects for an enormous spring wheat crop were never better. Grain plants looked "large, strong, green, healthy."

<sup>10/</sup> Report upon the condition of crops June 1, 1878. U. S. Dept. Agr. Spec. Rept. No. 5. 1878.



of 25- to 40-bushel yields in Iowa. In July, however, prospects for a bountiful harvest began rapidly to shrink. Even on July 10 the estimated yield in Minnesota was 19 to 20 bushels per acre.<sup>11/</sup> But on July 22 the damage was estimated by E. B. Bacon and Co., of Milwaukee, to be 17 percent in Wisconsin, 27 percent in Iowa, and 27 percent in Minnesota.<sup>12/</sup> On August 14 the Department of Agriculture made an estimate of 30 percent damage to spring wheat.<sup>13/</sup> Final production was 21,154,400 bushels in Iowa, 35,750,000 in Wisconsin, and 29,484,503 in Minnesota, making a total of only 86,388,903 bushels.

What were the factors that brought ruin to this luxuriant crop? Robinson <sup>14/</sup> states that "wheat blighted extensively in the southern and central parts of the State" (Minnesota); and the Howard County Times, of Cresco, Iowa, reported (July 25) on "blighted wheat and blighted hopes," attributing the damage to "blight, rust, and smut in the belt of country which has been most seriously affected" ranging "from central Iowa to central Minnesota, the worst being in the vicinity of the State line." "To those unfortunate enough to own wheat fields in southeastern Minnesota and northern Iowa," according to the St. Paul Pioneer Press of July 29, "it will not be necessary to speak of blight and rust and general failure...it has for some days been too apparent to need reiteration here." The failure in Minnesota is similarly attributed to blight by the crop statistician, who described the situation as follows:<sup>15/</sup>

"The wheat crop of this year (1878) will no doubt long be remembered because of its peculiarities. Prospects for a heavy yield were hardly ever more promising until the time it had reached its most critical period, just previous to harvest. It was then stricken with a sudden and disastrous blight which reduced the yield from the prospective average of about 20 bushels per acre of the highest grade of wheat, to 12½ bushels of the lower grades. Counties in the southern portion of the State were the greatest sufferers from this injury. In several of them less than 10 bushels per acre of the poorer grades of wheat were harvested. In the western and northern counties the crop was not so badly damaged, and there was a fair yield both as to quantity and quality..."

It is apparent from these statements and from many others encountered that the term "blight" was variously used; in some cases it was used synonymously with rust, in some to indicate an accompanying effect, in others as a general term to cover any unhealthy condition of the grain. Fairly definite identification of stem rust, however, is possible in such an account as the following:

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<sup>11/</sup> According to Mr. Pusey, Government crop estimator. Pioneer Press, July 10.

<sup>12/</sup> Attributed to late storms and excessive heat, Pioneer Press, July 23. Editor was of opinion that estimates were too high.

<sup>13/</sup> Winona Daily Republic, Aug. 14.

<sup>14/</sup> Robinson, Edward Van Dyke. Op. cit., p. 75.

<sup>15/</sup> Statistics of Minnesota for 1879. Eleventh Ann. Rept. Commissioner of Statistics. Pioneer Press Co., St. Paul, 1880, p. 21.



"Gloomy reports are coming from all quarters today of the condition of crops. Many samples of wheat said to be a fair average have been brought in, which show a heavy blight--from 50 to 75 percent. The stalks from the head down several inches are dead and covered with black rust and the heads also are turning black." Red Wing, Goodhue County, July 20, according to the St. Paul Pioneer Press of July 21.

Despite the confusion of terms, this description leaves no doubt that stem rust was involved. Stem rust also appears to be indicated by the term "black rust" in other statements:

"Lost Nation...samples will show you...black rust on the stalk and head which I think will not yield more than half a crop if it is not further injured." J. P. Buckingham, of Chester, Howard County, Iowa, in Northwestern Miller of July 26.

"In Winneshiek County (Iowa) the black rust is sweeping everything." Minneapolis Tribune, July 15.

"I have before me 20 samples of bluff wheat, by all odds the best in the county, it looks well but on a careful examination--say take 20 heads, rub them out carefully and you will see that there is not half the kernels there would be if only moderately filled... There are many large fields that will not be cut at all. Black rust, blight, and smut principally occasioned by the unusual heat has done it." Lake City, July 22, according to the St. Paul Pioneer Press of the 24th.

Furthermore, the presence of stem rust is indicated in the old colloquial use of the word "mildew" as a general term including rust, as in the following:

"The wheat, oats, and barley will suffer badly, partly from being prostrated and partly from rust or mildew." Madison (Wis.) Journal, quoted in the Rochester Post of July 19.

"Die Ernte war vom Mehltau ziemlich beschädigt"--The crop was badly damaged by mildew--according to the diary for 1878 of Cornelius Janzen, who came to Mountain Lake, Cottonwood County, Minn., from Russia in that year. In Annals of his Life, 1862--1913, Minn. Hist. Soc., St. Paul.

Whatever the opinion regarding the cause of the devastation, however, and whatever the term used to express it, a survey of observers' accounts leaves no doubt that there was abundant rust.

One current explanation given for low yields was the statement that the soils were exhausted. While the single-crop system had been followed for some time, responsibility of exhausted soils for the 1878 disaster could only have been contributory, in view of the fact that yields in subsequent years were not consistently so low.<sup>16/</sup> Undoubtedly other factors also

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<sup>16/</sup> Wheat, yields per acre and prices, by States, 50 years 1866-1915. Op. cit., p. 9.



contributed to the wheat failure, among them being excessive heat and moisture during the filling period, lodging, and storms at harvest time. Major responsibility was placed on one or more of these factors variously according to the observer in question. Heat was one of the favorites at the time. Stem rust would appear to be another primary consideration. While it is impossible at this date and in the absence of accurate reports by trained observers to apportion accurately the damage, it is clearly evident that there was considerable stem rust. Even today, when more is known about the effect of heat and rust on kernel shrinkage, experts find it impossible to state definitely that so much damage is due to heat and so much to rust. However, in view of the fact that the hot, wet weather that prevailed in July of the year under consideration is precisely suited to rapid rust development,<sup>17/</sup> one would be inclined to consider the possibility of rust damage as being more important than damage due to heat alone.

Available records indicate that the critical period of growing weather was hot and wet. April was a warm month at St. Paul, Minn., while May and June were cool and provided good growing conditions for grain. Although the average temperature at St. Paul in June was 0.5° higher than normal, night temperatures were low. With July, however, high temperatures began, and showers were frequent. During the first three weeks of July, over considerable areas of Minnesota, Iowa, and Wisconsin, it appears there was excessive rainfall and excessive heat. July rainfall totalled 4.47 in. at St. Paul and 3.63 in. at Minneapolis.<sup>18/</sup> Newspaper accounts indicate that it was well distributed through the month. Records from three points in northeastern Iowa<sup>19/</sup> indicate abundant or excessive rainfall in that section in both June and July; at Charles City there was a total of 8.63 in. in July, with .01 or more on 9 days, preceded by 5.10 in. in June; at Hesper, which is one mile from the Minnesota line, there were 5.58 in. in June and 13.20 in. in July, with 13 rainy days in the latter month; and at McGregor 6.54 in. was recorded in June and 9.73 in. in July. Maximum temperatures at St. Paul averaged 84.1° F. for July, a plus deviation of nearly 3°; and at Hesper, Iowa, the average maximum was 80.3°. However, it should be pointed out, in view of the claims regarding heat damage in 1878,

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<sup>17/</sup> "The heat of the last few days has been terribly demoralizing to the wheat crop. It was just that sultry, soggy, vapor bath sort of weather common enough a few degrees south of us and in the corn belt generally but rare in Minnesota." Pioneer Press, July 15. "Rains, heavy dews and hot sun have caused rust to appear. Small grain considerably injured...especially wheat." Reprinted from St. Peter Tribune in Winona Daily Republic, July 12. "Hot, muggy, sweltering weather is having a bad effect upon the wheat crop... the greatest apprehension generally being from rust." Martin County Sentinel (Fairmont), July 19.

<sup>18/</sup> U. S. Dept. Agr., Weather Bureau. Climatic summary of the United States. (Climatic data herein from the establishment of stations to 1930, inclusive.) Sec. 46--Southeastern Minnesota, pp. 9, 10, 15. 1934.

<sup>19/</sup> Report of the Secretary of the Iowa State Agr. Soc. for the year 1878. 988 pp. Des Moines, 1878. L. P. Fitch, observer at Charles City, p. 543; James Harkness at Hesper, p. 957; Frank Larrabee at McGregor, p. 496.



that July temperatures were higher in the Twin City section in two recent heavy rust years; in 1935 (at Minneapolis) the average maximum was 89.6°; in 1937, 87.5°. Minimum temperatures also were lower in 1878, the average being 65.1°, compared with 70.1° in 1935 and 66.6° in 1937. Beginning about July 20, in 1878, cool weather prevailed for about a week throughout much of southern Minnesota, with storms in some sections which did some damage, and then temperatures again were high. Heat hastened ripening in some sections, and harvesting was jeopardized by storms or by frequent rains. Reports in the Winona Daily Republic present a fairly representative picture of weather conditions in June and July:

June 4, May coolest in five years. Wheat favored.

13, Cool summer, "hardly warrants a straw hat or linen coat."

19, General rain at night.

20, "About 86°"; shower.

24, "Mercury is climbing into the 90's."

27, "This weather is enough to confirm Brother Jasper's theory that 'De sun do move'."

28, "If this weather is not good for 'cawn,' why 'cawn' must be very hard to please."

29, "The weather for the past two days has been hot and showery, a combination...very damaging to wheat and very likely to produce rust... Reports from different points in the interior represent that the growing wheat already shows considerable injury from rust."

30, Drenching rain, with shower at night.

July 3, Recent heavy rains and sultry weather.

5, "80° in the shade at 7 o'clock this morning."

6, "Mercury was strong at 90°."

7, (On July 8) "Sunday must be credited with a cooling shower, altho, on the whole, the day was a scorcher." Some early wheat ready to harvest within ten days.

9, Rainstorm.

10, Rain in evening.

11, Rain in morning; shower in evening.

12, 90-92°.

13, "Clearer... and more air stirring." 90-92°.

15, "One of the hottest days of the season...94° in the shade."

Rain in afternoon.

16, Rain in evening. 97°.

17, Drenching storm general along Winona and St. Peter Railroad.

18, Cooler and clearer, with good breeze from the east.

19, Pouring rain of several hours.

20, West-Northwest wind in afternoon. Cool change.

24, Outlook rainy again.

25, More rain!

26, West wind. Harvesting begins.

27, Clear.

29, Cloudy. "This weather is considered as another black eye for the wheat crop."

30, Good day for harvest.



That these conditions were fairly general in the territory under consideration is indicated by these additional scattered reports from various points: At Des Moines, Iowa, temperatures between July 11 and 18 were from 90 to 96°, and storms and damp heat were reported from Dubuque for the same period. On the 13th, frequent rains were reported at Eau Claire, Wis.; and on the 14th, hot, sultry weather, with heavy rains, was reported in Winne-shiek County, Iowa. Heavy rains and muggy weather occurred in southern Wisconsin previous to the 19th, and on the same date in the vicinity of LaCrosse it was stated that it was "still very hot and rains were of daily occurrence." Heavy storms occurred in western and central Minnesota on the 24th. Worthington, in the southwestern section, reported rains on August 1, and Luverne had rains previous to and during harvesting. It would appear, therefore, that July was hot and wet over a considerable territory, furnishing conditions that normally promote rapid rust development.

As in present-day experience, there were conflicting reports as to rust occurrence and severity. Observers did not agree in all cases as to damage estimates, and various factions for the same reasons as obtain today were anxious to spread gloom or to be optimistic. However, it is plain that there was considerable local variation 20/ within the stricken area, due to varietal differences, 21 soil, 22/ position of fields, 23/ date of sowing

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20/ Frontenac estimated yields of 18-22 bu. an acre, according to the Winona Daily Republic of July 29, while "back on the prairie, farmers complain bitterly of the rust and blight." According to the Rochester Record (Winona Daily Republic, Aug. 26), Olmsted County reports varied greatly as to quality and quantity "in the same town, neighborhood, or upon adjoining farms. This indicates that the yield of wheat has been largely affected by the conditions under which it was raised, such as soil, quantity and quality of seed, the variety sown, the time of sowing, etc." In Steele County, yields were larger and of better quality on woodland farms than on prairies (Pioneer Press, Aug. 6). Variable yields were reported in Winona County (Winona Daily Republic, Aug. 8) of 20.5, 15+, 13, and 10 bu. an acre of 51-lb. wheat.

21/ E. M. Britts and Co., of Osage, Iowa, on July 28 stated: "Our farmers last spring sowed at least 20 bu. of Lost Nation to one of Fife, so we are all a lost nation in this section, as it will not yield over 5 bu. of screenings per acre. Fife will yield about 20 bu. per acre, some fields as low as 15, others 25...blight did it..." Northwestern Miller, Aug. 2. The Rochester Post reports on July 19: "We learn from reliable sources that the variety of wheat known as Lost Nation is a complete failure, the heads being uniformly blighted." And on July 26, Lost Nation was reported badly crinkled and shrunk, White Russia almost as bad, Brooks not so bad, Fife best. All samples indicated a serious shrinkage "from blight and rust."

22/ Robert Duncan, near Minnesota City, reported a yield of 20 bu. of No. 1 wheat sown March 6 on clay soil, while Duncan Sr., at Fremont, cut only 50 percent of his grain because it was so poor. (Winona Daily Republic, Aug. 5.)

23/ The weekly review of St. Paul markets, as reported in the Pioneer Press of July 24, stated: "The best opinion seems to be that the damage of the last ten days is revealed in spots--that where one farmer's crop has been



or maturity,<sup>24/</sup> and to other factors. The variety "Lost Nation"<sup>25/</sup> appeared to be most susceptible to rust damage, while "Fife" (variously spoken of as Hard Fife, Red Fife, etc.) was injured least.

As another explanation of distinct local variations in rust severity, barberry bushes cannot be overlooked. Yankee settlers in southeastern Minnesota are said to have brought barberry bushes with them from the East, as ornamental and otherwise useful plants. Since the connection between rusted wheat and barberry apparently was not generally known in 1878,<sup>26/</sup> settlers were ignorant of the harm they were doing in introducing bushes. Records indicate that one planting was made as early as 1857 in the old "Portland Prairie" district of Houston County;<sup>27/</sup> and, judging from the

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seriously injured his next neighbor's fields were barely touched. Probably the locality had much to do with this seeming favoritism. It is frequently shown...that one farmer whose lands are uplands has not been much hurt, while his neighbor whose lands are lowlands has been very badly damaged."

<sup>24/</sup> "Late sown badly affected with rust," at Dassel, Meeker County. At LeMars, Iowa, "Late sown wheat badly blighted and yield will not exceed one-half or three-fourths of what was anticipated earlier. Early sown is all right." Pioneer Press, July 23.

<sup>25/</sup> "Lost Nation is an old awnless spring wheat of the northeastern United States, which has now gone out of cultivation." Clark, J. Allen, John H. Martin, and Carleton R. Ball, Classification of American wheat varieties. U. S. Dept. Agr. Bull. 1074, 1922. According to Dr. Andrew Boss, of the Minnesota Agricultural Experiment Station, who remembers the wheat, Lost Nation was a soft wheat, yielded well, but lacked good milling qualities, and because of this and other defects its use was discontinued in Minnesota. According to the "Dictionary of spring wheat varieties," Northwest Crop Improvement Assoc., Minneapolis, Minn., 1933, Red Fife is a hard red spring wheat, grown under several names, such as Canadian Fife, Scotch Fife, Fife, and Saskatchewan Fife. "It almost disappeared in the Northwest because it matures late and does not yield well in comparison with Marquis. It is not resistant to stem rust." (p. 43.)

<sup>26/</sup> Blue Earth City Post, July 20, reported that scientists had just established the fact of a connection which practical farmers already knew to exist. This probably referred to the discovery made in 1864 by De Bary of the function of the aecia on barberry in the life cycle of the rust organism. Subsequent issues were examined for repercussions from this statement, with negative results. Weather was often held to be the cause of rust, and other explanations appeared in print from time to time.

<sup>27/</sup> Statement by G. W. Metcalf, Sr., to the effect that his father had brought one plant of barberry from the East "nearly 70 years ago" was recorded on the original barberry survey slip of April 25, 1919, by J. M. Holzinger, barberry scout. The father presumably was Cornelius Metcalf, Jr., who came to "Portland Prairie" from Blackstone, Mass., in 1857, and whose son, George W. Metcalf, was born in 1861. H. V. Arnold. Old Times in Portland Prairie, Houston County, Minn., including Family Records, 1851--1880. Larimore, N. Dak., 1911. p. 20, 112.



density and size of bushes found in this district subsequently,<sup>28/</sup> other early settlers also made the mistake of planting barberry along with their wheat. In the Mankato area there is record of bushes that had escaped from cultivation as early as 1883.<sup>29/</sup> It is significant that the bushes were observed in "old" fields--evidence that cultivation of these fields already had been abandoned at this early date, presumably as a result of destruction of the grain by rust spread from the bushes. The presence of barberry at an early date also is indicated by notes made in the course of the barberry survey in 1919. Bushes were said to have been planted in the 60's on the Fred Gilmore farm in Carlston Township, Freeborn County, where, owing to the rust epidemic of 1904, the owner heard about the relation of barberries to rust and eradicated the bushes. In 1919 there were still 81 bushes on the property. A hedge of 1,450 bushes found in that year on the Mankato golf course contained bushes that were estimated to be 50 years old, which would take them back to 1870. Bushes of about the same age were observed on the S. T. Bigelow farm near Rochester, Olmsted County, from which about 1,000 barberry bushes were removed in 1919. In about 1870, also, the first bush was stated to have been brought to the Brown farm near Mable, Newburg Township, Fillmore County; and in 1920 one bush was found on the Rossman property at Chatfield that remained from a hedge planted about 1870. In Iowa, as would be expected, barberries were planted somewhat earlier, the first authentic date according to Pammel <sup>30/</sup> being 1851. "It is probable," in the opinion of Rohrbaugh,<sup>31/</sup> "...that not many barberries were brought into the main farming section of Iowa before about 1860," but by 1879 they "evidently were fairly common." From these records, therefore, it is evident that wherever there were settlers there were barberry bushes also, although just how many there were in the spring wheat area by 1878 can only be conjectured. However, the bushes undoubtedly were numerous enough, particularly near the older settlements, to have contributed significantly to the rust epidemic and consequent failure of wheat.

### Summary

Stem rust apparently was an important factor in greatly reducing the size and quality of the spring wheat crop of 1878. Good growing weather prevailed until July, and a luxuriant crop, with tall, dense stands, promised prospects of a record-breaking harvest. July, however, was hot and wet, furnishing ideal conditions for rust development. Rains were frequent, and lodging resulted. Furthermore, the variety "Lost Nation" was grown extensively and proved to be very susceptible to stem rust. Local variation

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<sup>28/</sup> According to Dr. Leonard W. Melander, Pathologist and Leader in Barberry Eradication for Minnesota, to whom the writer is indebted also for access to survey record cards.

<sup>29/</sup> "Berberis vulgaris L. Spontaneous in old fields, Mankato. Leiberg." Warren Upham. Catalogue of Flora of Minnesota. Minneapolis, 1884. p. 21.

<sup>30/</sup> Pammel, L. H. The barberry in Iowa and adjacent States. Iowa Acad. Sci. Proc. 26: 193-237. 1919.

<sup>31/</sup> Rohrbaugh, P. W. The barberry and black stem rust in Iowa. Unpublished ms. on file in Iowa State Barberry Office, Ames, Iowa.



in the development of rust was attributable to a number of factors, among which planted and escaped barberry bushes were undoubtedly in part responsible. The result was a crop of low yield and poor quality.

#### Additional Source Material

##### Ms. Diaries

Dawley, Allen. Diaries, 1845-1925 (Smithfield, Highland, Northfield).  
Minn. Hist. Soc., St. Paul.

Griffen, T. H. Diary, 1878-1883 (Clinton Falls). Minn. Hist. Soc.,  
St. Paul.

Whipple, Henry B. Papers, 1833-1908. Minn. Hist. Soc., St. Paul.

##### Books

Folwell, William Watts. A history of Minnesota. Vol. 3. Minn. Hist. Soc.,  
St. Paul, 1926.

Larson, Henrietta M. The wheat market and the farmer in Minnesota, 1858-1900.  
273 pp. N. Y. Columbia Univ. Studies in History, Economics,  
and Public Law, Vol. 122, No. 2. Whole No. 269. 1926.

Thompson, J. G. Rise and decline of the wheat growing industry in Wisconsin.  
250 pp. Bull. Univ. Wis. 292, Economics and Political Sci.  
Ser. Vol. 5, No. 3. 1909.

##### Newspapers and Periodicals

(The) Advance, Red Wing, Minn. July 15 to Aug. 25, 1878.

Anti-Monopolist, St. Paul, Minn. Aug. 1 to Oct. 3, 1878.

Blue Earth City Post, Blue Earth, Minn. July 20 to Sept. 14, 1878.

(The) Cultivator and Country Gentleman. Vol. 43, No. 1327 (July 4), No. 1337  
(Sept. 12), 1878. Albany, N. Y.

Howard County Times, Cresco, Iowa. July 18 to Aug. 1, 1878. (Read by  
Leonard W. Melander.)

(The) Jackson Republic, Jackson, Minn. June 22 to Sept. 31, 1878.

Mankato Record, July 1 to Aug. 10, Aug. 24 to Sept. 7, 1878.

Martin County Sentinel, Fairmont, Minn. July 5 to Sept. 6, 1878.

Minneapolis Tribune, Minneapolis, Minn. Aug. 5 to Oct. 15, 1878.

(The) Northwestern Miller, LaCrosse, Wis. Apr. 12 to Sept. 20, 1878.

Preston Republican, Preston, Minn. July 11 to Oct. 10, 1878.

Rochester Post, Rochester, Minn. June 26 to Aug. 30, 1878.

Rock County Herald, Luverne, Minn. July 5 to Sept. 6, 1878.

St. Paul Pioneer Press, St. Paul, Minn. June 10 to Aug. 15, 1878.

Winona Daily Republic, June 4 to Sept. 2, 1878.

Worthington Advance, Worthington, Minn. July 4 to Aug. 29, 1878.



